BROOKHAVEN NATIONAL LABORATORY

Work Permit # SDD-2016-12
Work Order # ___
Job# ___ **Activity#** ___

See "Instructions for Filling out the Work Permit" contained in the Work Planning and Control for Experiments and Operations Subject Area.

1. Work request WCC fills out this section. ☐ **Standing Work Permit**

Requester: Don Lynch	Date: 7/15/2016	Ext.: 2253	Dept/Div/Group: PO/PHENIX
Other Contact person (if different from requester): Carter Biggs			Ext.: 7515
Work Control Coordinator: Don Lynch		Start Date: 7/15/2016	Est. End Date: 9/30/2016
Brief Description of Work: MPC Removal and Repurposing			
Building: 1008	Room: IR	Equipment: MPC South & North	Service Provider: MPC Experts & PHENIX Techs

2. WCC, Requester/Designee, Service Provider, and ESSH (as necessary) fill out this section or attach analysis

ESSH ANALYSIS

Radiation Concerns	☐ None	☒ Activation	☐ Airborne	☐ Contamination	☐ Radiation	☐ NORM	☐ Other
☐ Special nuclear materials involved, notify Isotope Special Materials Group				☐ Fissionable/Radiological materials involved, notify Laboratory Nuclear Safety Officer			
Radiation Generating Devices:	☐ Radiography		☐ Moisture Density Gauges	☐ Soil Density Gauges		☐ X-ray Equipment	

Safety and Security Concerns	☐ None	☐ Explosives	☐ Transport of Haz/Rad Material	☐ Pressurized Systems
☐ Adding/Removing Walls or Roofs	☐ Critical Lift	☐ Fumes/Mist/Dust*	☐ Magnetic Fields*	☐ Railroad Work
☐ Asbestos*	☐ Cryogenic	☐ Heat/Cold Stress	☐ Nanomaterials/particles*	☐ Rigging
☐ Beryllium*	☐ Electrical	☐ Hydraulic	☐ Noise*	☐ Silica*
☐ Biohazard*	☒ Elevated Work	☐ Lasers*	☐ Non-ionizing Radiation*	☐ Security Concerns
☐ Chemicals/Corrosives*	☐ Excavation	☐ Lead*	☐ Oxygen Deficiency*	☐ Suspect/Counterfeit Items
☐ Confined Space*	☐ Ergonomics*	☐ Material Handling	☐ Penetrating Fire Walls	☐ Vacuum
Ladder Access Required: ☐ Portable Ladder ☐ Fixed Ladder– Status/Restrictions:				
* Safety Health Rep. Review Required	☐ Haz, Rad, Bio Material Exceed DOE 151.1-C Levels - Contact OEM			☐ Other

Environmental Concerns	☒ None	☐ Work impacts Environmental Permit No.	
☐ Atmospheric Discharges (rad/non-rad/GHG)	☐ Land Use Institutional Controls	☐ Soil Activation/contamination	☐ Waste-Mixed
☐ Chemical or Rad Material Storage or Use	☐ Liquid Discharges	☐ Waste-Clean	☐ Waste-Radioactive
☐ Cesspools (UIC)	☐ PCB Management	☐ Waste-Hazardous	☐ Waste-Regulated Medical
☐ High water/power consumption	☐ Spill potential	☐ Waste-Industrial	☐ Historical Enviornmental Hazards
Waste disposition by:			☐ Other
Pollution Prevention (P2)/Waste Minimization Opportunity: ☒ No ☐ Yes		Environmental Preferable Products Available: ☒ No ☐ Yes	

FACILITY CONCERNS	☒ None	☐ Intermittent Energy Release		
☐ Access/Egress Limitations	☐ Electrical Noise	☐ Potential to Cause a False Alarm		☐ Vibrations
☐ Credited Controls (Use USI Process)	☐ Impacts Facility Use Agreement		☐ Temperature Change	☐ Other
☐ Configuration Management	☐ Maintenance Work on Ventilation Systems		☐ Utility Interruptions	

WORK CONTROLS

Work Practices

☐ None	☐ Exhaust Ventilation	☒ Lockout/Tagout	☐ Spill Containment	☐ Security (see Instruction Sheet)
☒ Back-up Person/Watch	☐ HP Coverage	☐ Posting/Warning Signs	☐ Time Limitation	☐ Other
☐ Barricades	☐ IH Survey	☒ Scaffolding-requires inspection	☐ Warning Alarm (i.e. "high level")	☐ Electrical Inspection Required

Personal Protective Equipment

☐ None	☐ Ear Plugs	☒ Gloves, as necessary	☐ Lab Coat	☒ Safety Glasses, where req'd
☐ Coveralls	☐ Ear Muffs	☐ Goggles	☐ Respirator*	☐ Safety Harness
☐ Disposable Clothing	☐ Face Shield	☐ Hard Hat	☐ Shoe Covers	☒ Safety Shoes, as req'd ☐ High visibility cloths/vest ☐ Other

Permits Required (Permits must be valid when job is scheduled.)

☒ None	☐ Cutting/Welding	☐ Impair Fire Protection Systems
☐ Concrete/Masonry Penetration	☐ Digging/Core Drilling	☐ Rad Work Permit-RWP No
☐ Confined Space Entry	☐ Electrical Working Hot	☐ Other

Dosimetry/Monitoring

☒ None	☐ Heat Stress Monitor	☐ Real Time Monitor	☐ TLD
☐ Air Effluent	☐ Noise Survey/Dosimeter	☐ Self-reading Pencil Dosimeter	☐ Waste Characterization
☐ Ground Water	☐ O_2/Combustible Gas	☐ Self-reading Digital Dosimeter	☐ Other
☐ Liquid Effluent	☐ Passive Vapor Monitor	☐ Sorbent Tube/Filter Pump	

Training Requirements (List specific training requirements)

CA –Collider User, PHENIX Awareness, working at heights

Work screening has identified the following as the reason for permitted work:	**When work is categorized as worker planned work and a permit is used only the following signatures are required: (Although allowed, there is no need to use back of form)**	
☐ **ESSH**	WCC:	Date:
☐ **Complexity**	Service Provider:	Date:
☐ **Work Coordination**	Authorization to start:	Date:
☒ **Permit Not Required** (Sections 3 through 7 optional)	(Department/Division, or their equivalent, Sup/WCC/Designee)	

3. Both work requester and service provider contribute to work plan (use attachments for detailed plans)

Work Plan (procedures, timing, equipment, scheduling, coordination, notifications, and personnel availability need to be addressed in adequate detail): See attached work plan and procedure
Special Working Conditions Required (e.g., Industrial Hygiene hold points or other monitoring) None
Notifications to operations and Operational Limits Requirements: None
Post Work Testing, Notification or Documentation Required: See Attached Plan

Job Safety Analysis Required: ☐ Yes ☒ No	Review Done: ☒ in series ☐ team

Reviewed by: * Primary Reviewer signature (not required for Worker Planned Work) means that the Review Team members were appropriate for the work that was planned, the Team visited the job site, hazards and risks that could impact ESSH have been considered and controls established according to BNL requirements. In addition, this signature indicates that applicable JRAs, FRAs, as well as other planning documents have been reviewed and training requirements have been identified and recorded on this permit.

Title	Name (print)	Signature	Life #	Date
ES&H Professional				
F&O Facility Project Manager				
Service Provider				
Work Control Coordinator	Don Lynch		20146	
Safety Health Representative				
Research Space Manager				
Other				
Other				
Required Walkdown Completed				
*Primary Reviewer				

4. Job site personnel (Supervisor and workers) fill out this section.

Note: Signature indicates personnel performing work have read and understand the hazards and permit requirements (including any attachments) and all training required for this permit is current/complete. Job Supervisor/Contractor Supervisor signatures also includes verification that worker training required for this permit is current/complete.

Job Supervisor:		Contractor Supervisor:	
Workers:	Life#:	Workers :	Life#:

Workers are encouraged to provide feedback on ESSH concerns or on ideas for improved job work flow. Use feedback form or space below.

5. Department/Division, or their equivalent, Line Manager or Designee

Conditions are appropriate to start work: (Permit has been reviewed, work controls are in place and site is ready for job.)

Name:	Signature:	Life#:	Date:

6. Worker provides feedback.

Worker Feedback (use attached sheets as necessary)

a) WCM/WCC: Are there any changes as a result of worker feedback? ☐ Yes ☐ No

Note: See Work Planning and Control for Experiments and Operations Subject Area section 2.6.

7. Post Job Review/Closeout: Work Control Coordinator (authorizing dept.) checks quality of completed permit and ensures the work site is left in an acceptable condition. (WCC can delegate clean up of job site to work supervisor.) The WCC ensures that the change process to update drawings, placards, postings, procedures, etc., is initiated, if necessary.

Name:	Signature:	Life#:	Date:
Comments:			

Work plan Attachment **WP# SDD-2016-12/**
MPC South and North Detector Subsystems, Removal and Repurposing
PHENIX IR, Bldg. 1008

Discussion

After run 16 the north and south MPC detector subsystems will be removed from the PHENIX detector and moved to building 510 (PHYSICS) to be stored for potential repurposing for sPHENIX or until final disposition of components is otherwise determined.

Caution: During all phases of the work described herein, maintain extreme care at all times to prevent contact with the beam pipe.

Procedures

A. Removal of North MPC (South is similar)

1. LOTO the power to the MMN magnet coil at the power supply in1008B. (this should already be done immediately after run 16 ended, but this step is included to make sure it has been done)

2. Assure that the CM is locked in its southern most position by locking out the hydraulics to each magnet mover.

3. Assure that all power to the detector is locked out.

   Note: The station 1 scaffolding is being shared with the MPC-Ex remooval effort. All descriptional, authorizing information, etc. concerned with the scaffolding is described in the separate Work Permit for the MPC-Ex detector, WP# SDD-2016-011.)

4. Using the station 1 scaffolding (currently erected for removal of the MPC-Ex detector) to access the MMN piston cavity, carefully detach the signal and power cables, move the detached cables away from the piston hole and secure them so that they will not interfere with MPC removal.

5. Remove the electronics cards and front panels from each of the sextants,

6. Remove the individual modules from each sextant and carefully stow them for repurposing.

7. Disassemble the individual sextants

8. Check all removed parts for activation and record in the R&R database.

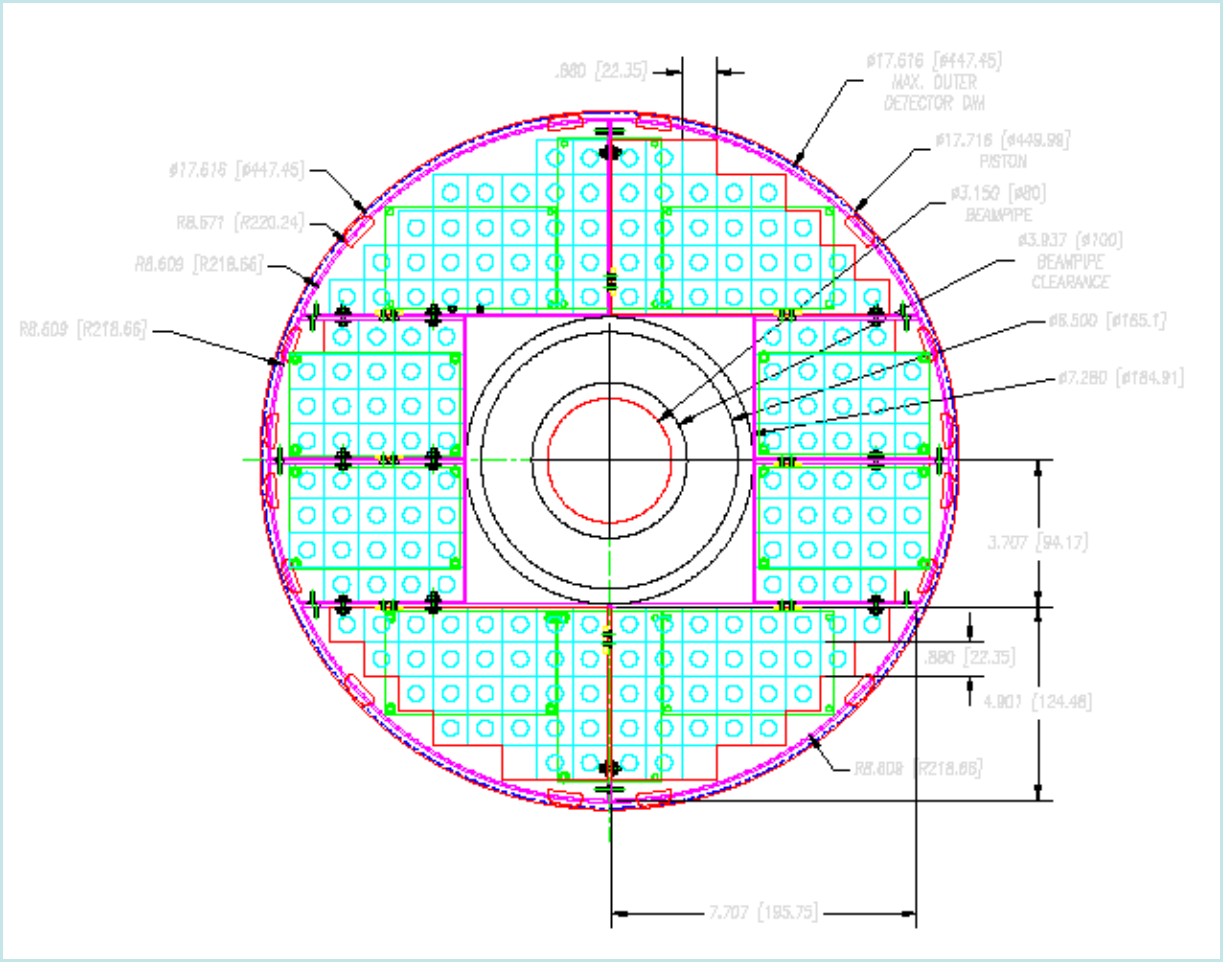
9. After sextants are removed and checked for activation, transport them to the MPC temporary staging area in the PHENIX electronics assembly room and reassemble the individual modules into the sextants to store until ready for repurposing.

10. Move the MPC sextant modules to an appropriate PHENIX/sPHENIX lab space in building 510 for storage until potential repurposing for sPHENIX or until final disposition of components is otherwise determined.

11. The process for removing the MPC south is similar and any differences can be handled by PHENIX technicians as worker planned work. The order in which the south MPC and north MPC are removed will be determined by worker planned work depending on the relative convenience of accomplishing these tasks while other PHENIX R&R tasks are being accomplished in parallel efforts.

12. After all removal tasks are completed this work permit shall be closed out after recording any lessons learned or recording any other potentially useful information concerning the subject effort.

MPC South Design

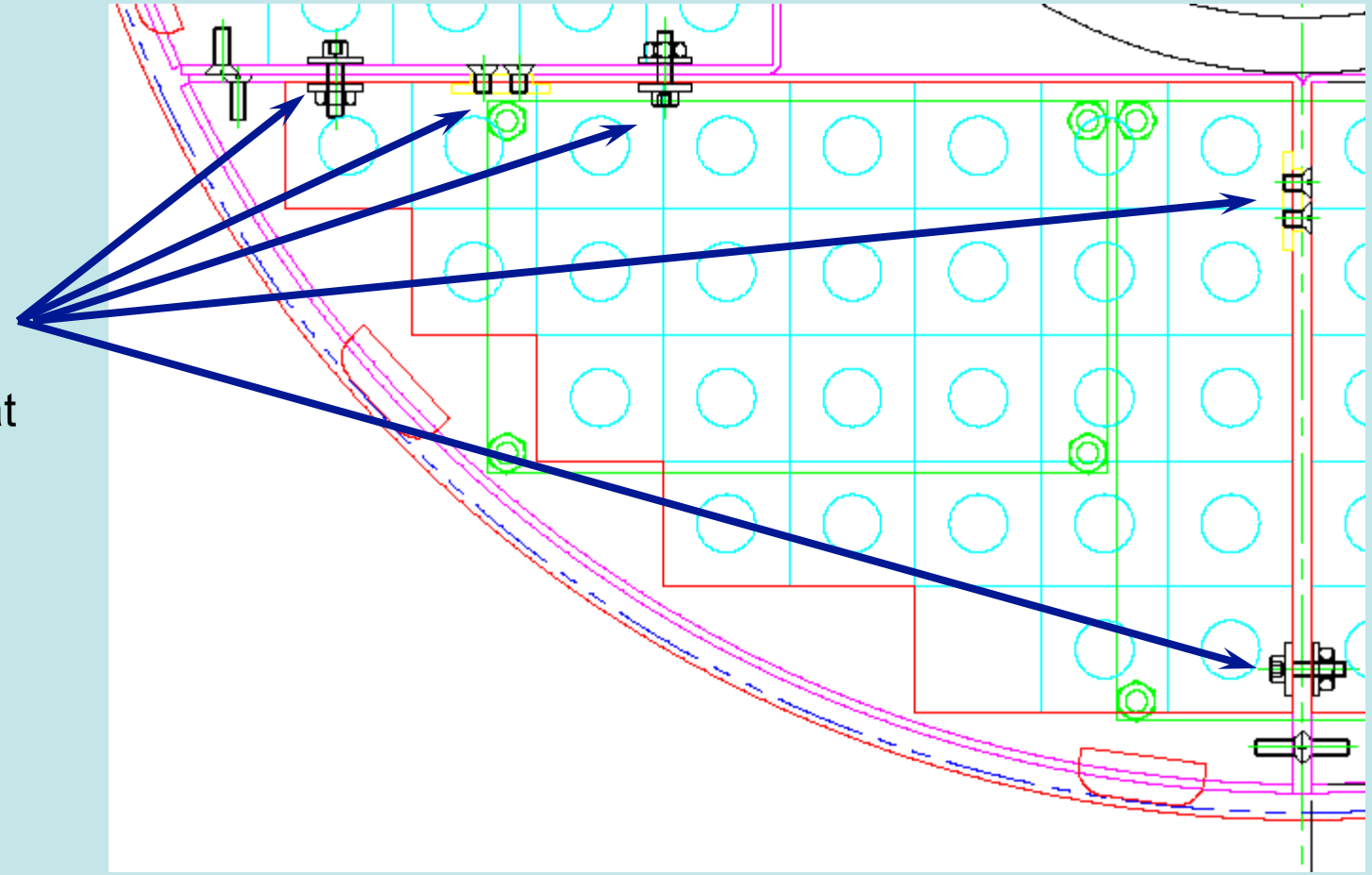


8 modules:

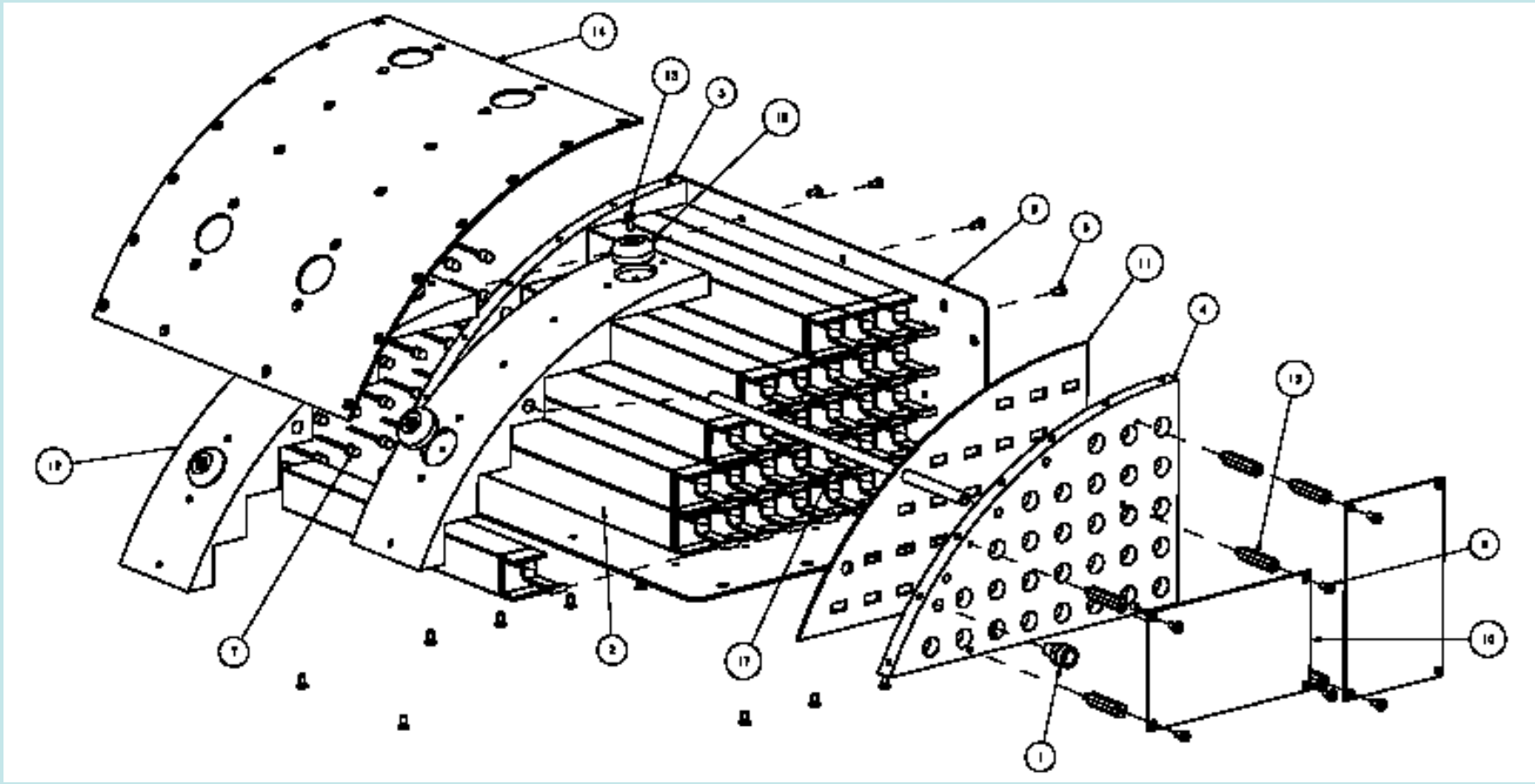
- 4 wedges w/ 29 crystals each
- 4 bricks w/18 crystals each
- 188 crystals total

MPC South Design

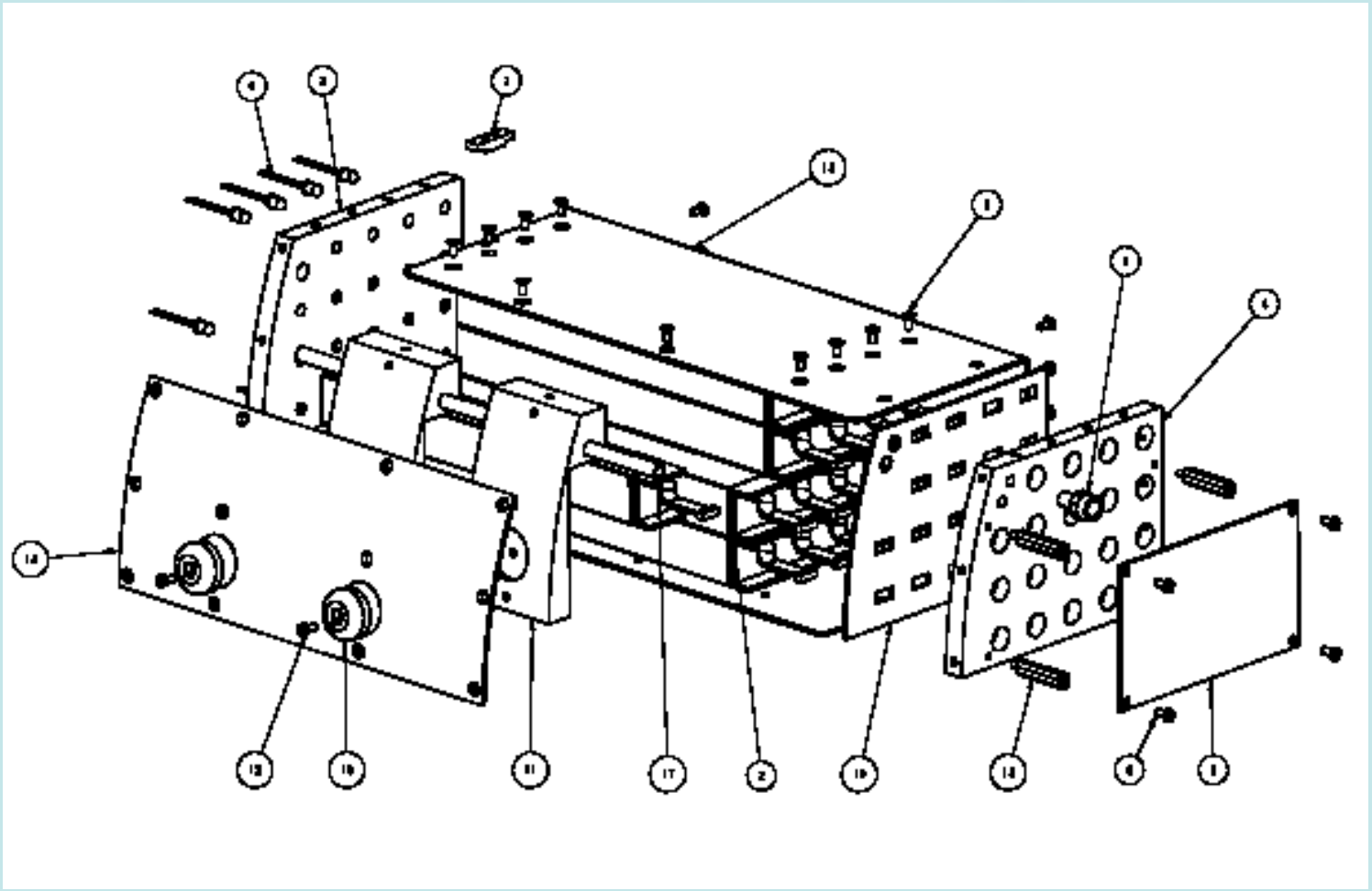
Modules are attached to adjacent modules with tab/slots at rear and screws at front



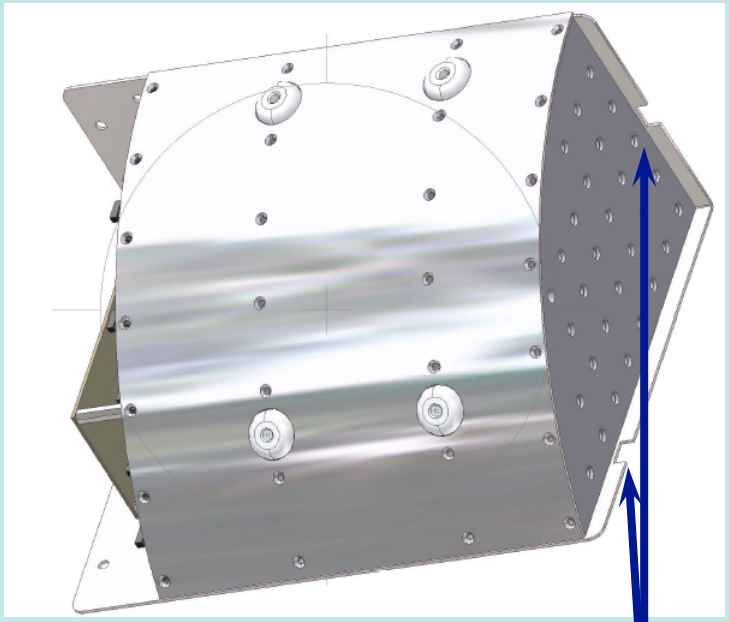
MPC South Design

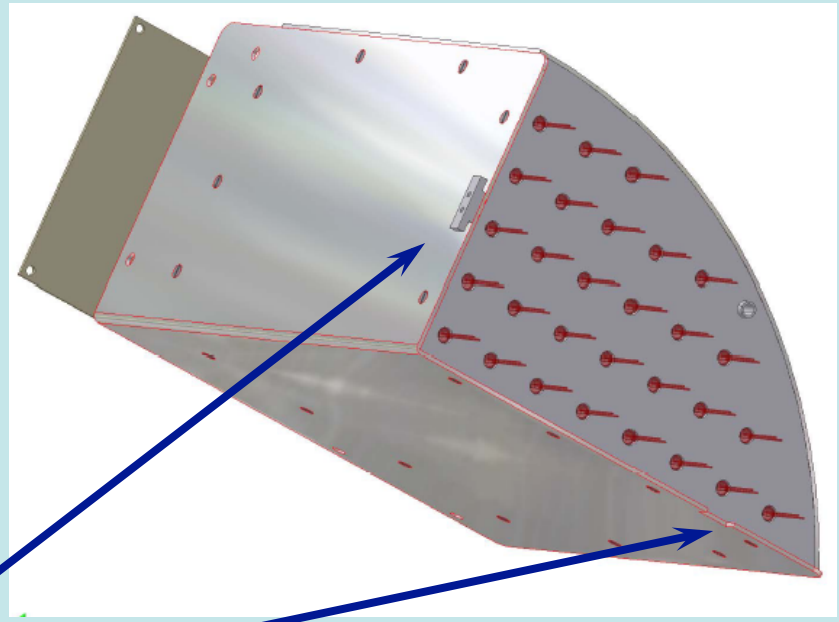


MPC South Design



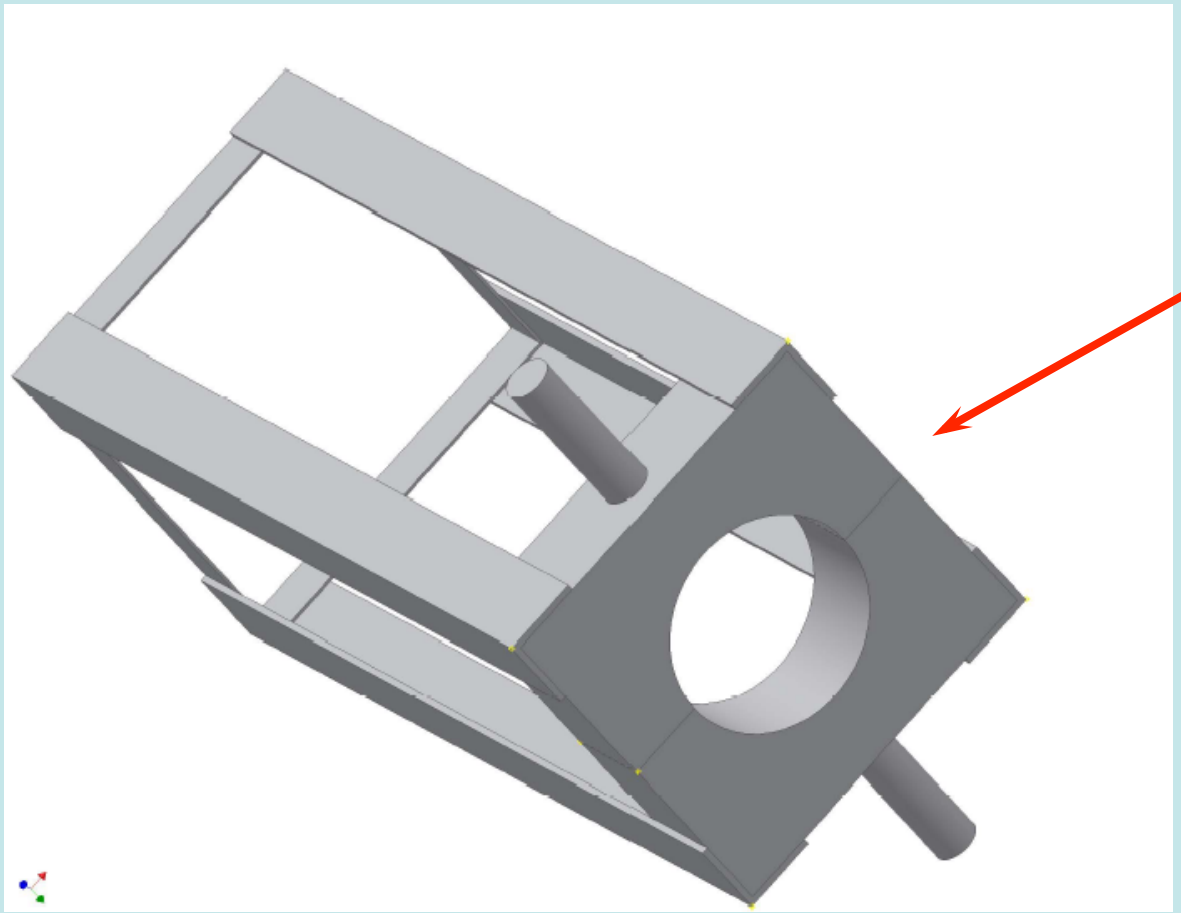
MPC South Design Installation





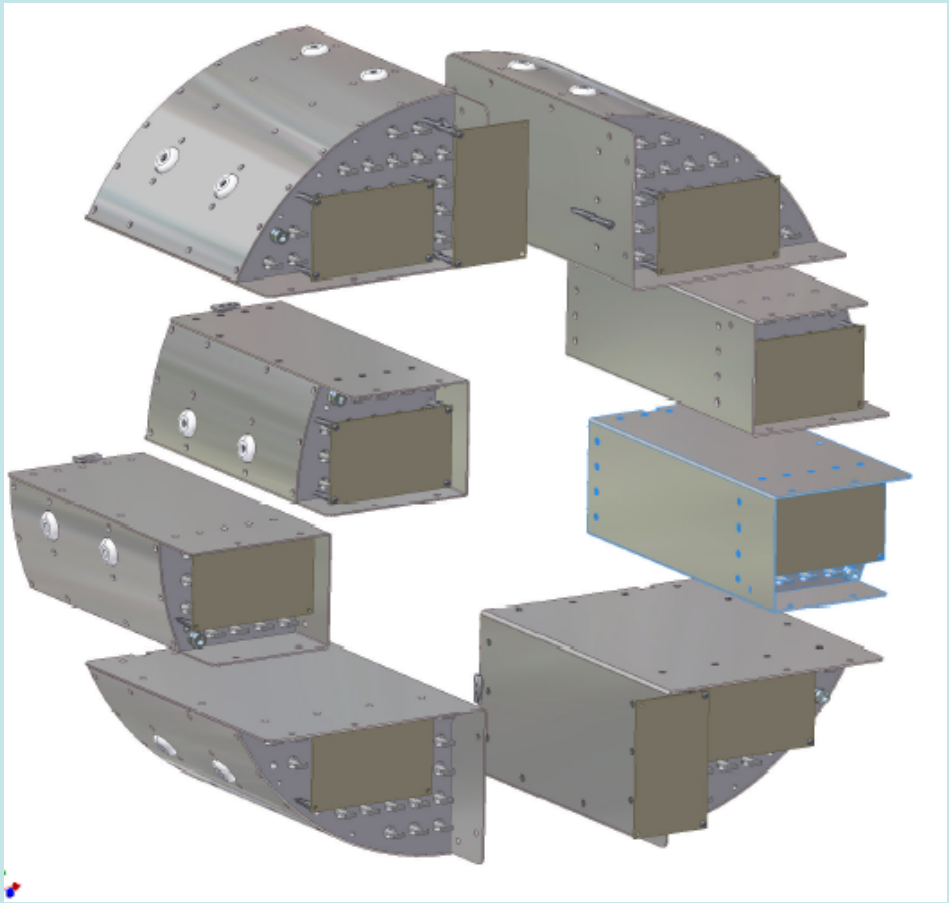
Locking Tabs at rear of modules

MPC South Design Installation



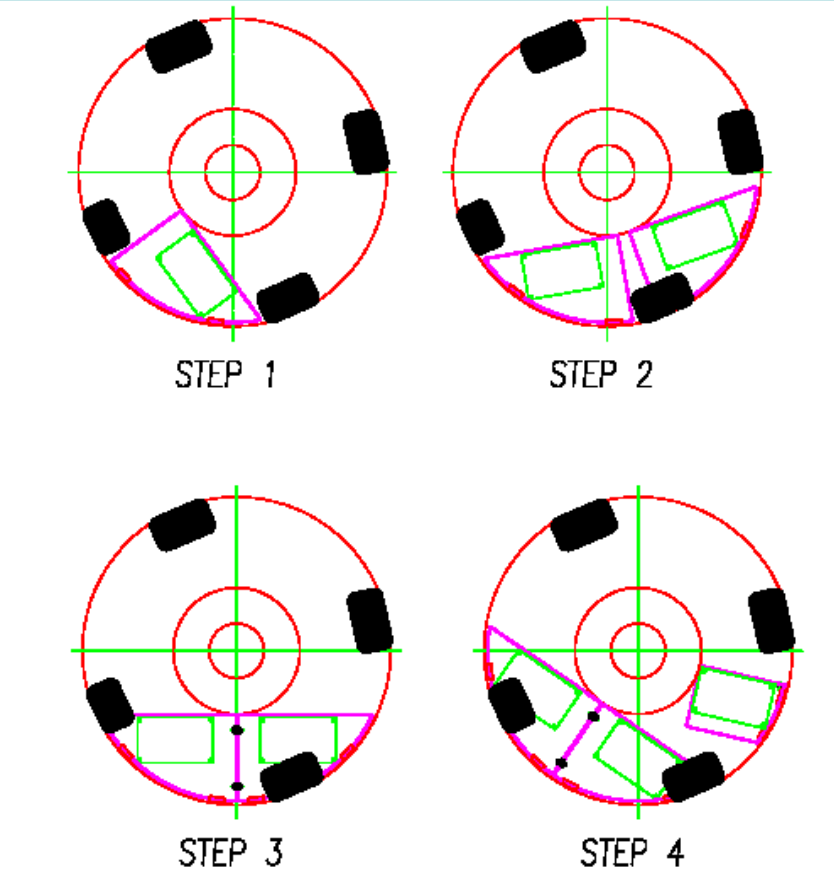
MPC Installation Tool

MPC South Design



MPC South Design Installation

1. Insert lower-west wedge module



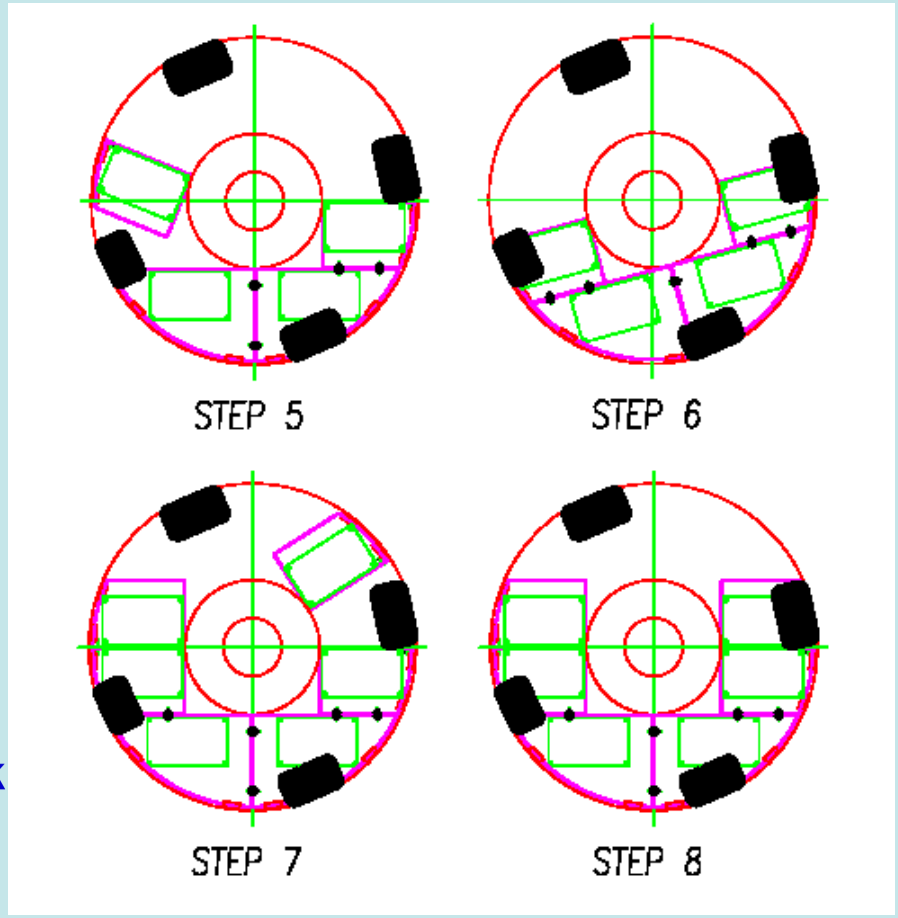
2. Rotate lower-west wedge module counter-clockwise, insert lower-east module

3. Rotate lower wedge modules to normal position

4. Rotate lower wedge modules clockwise, insert below-center west block module

MPC South Design Installation

5. Rotate modules back to normal position. Insert below-center east block module



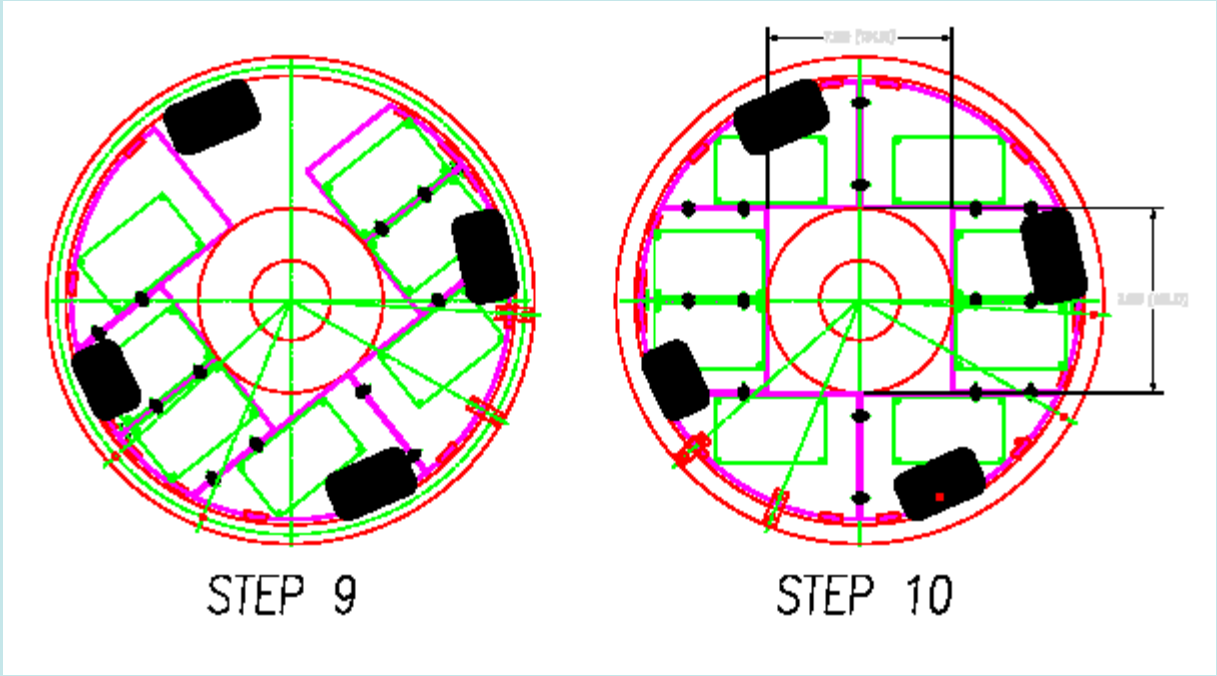
6. Rotate modules counter-clockwise, insert above-center east block module

7. Rotate modules to normal position. Insert above-center West block module

8. Ready for upper wedge modules

MPC South Design Installation

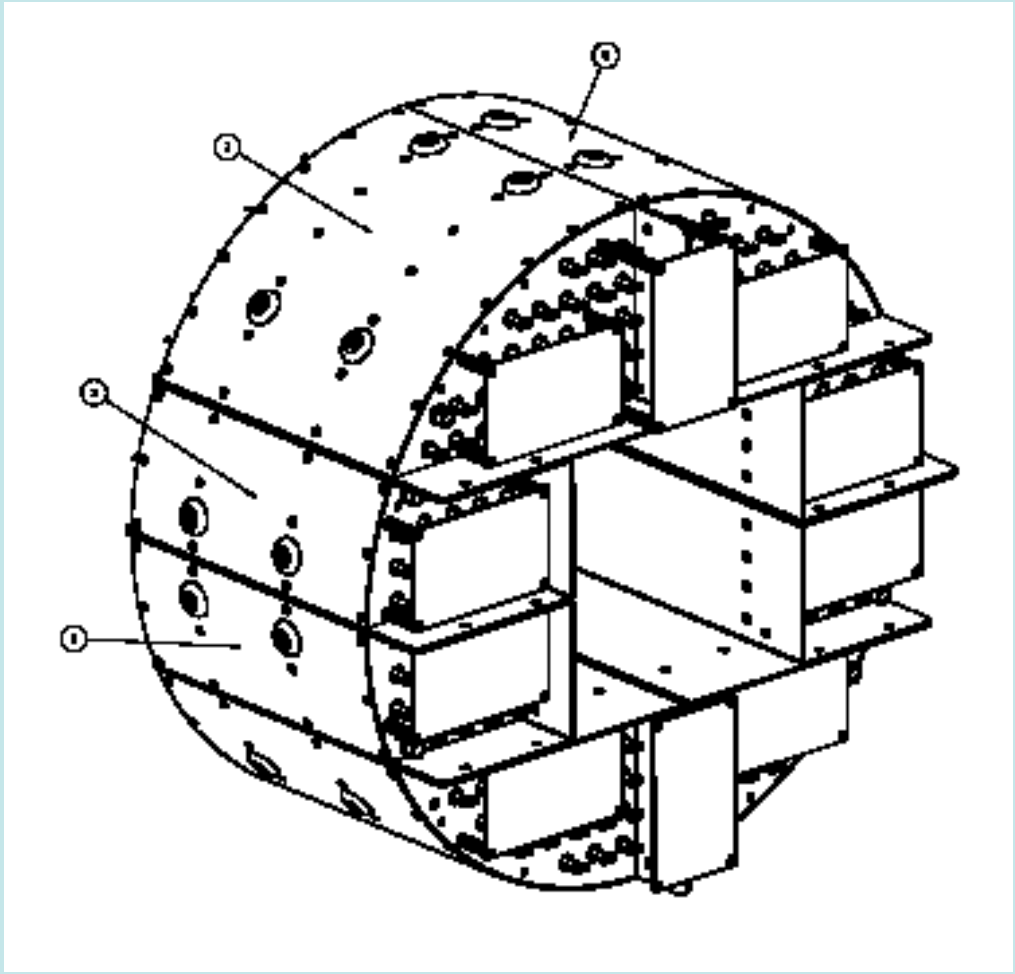
9. Rotate modules counter-clockwise. Insert upper east wedge



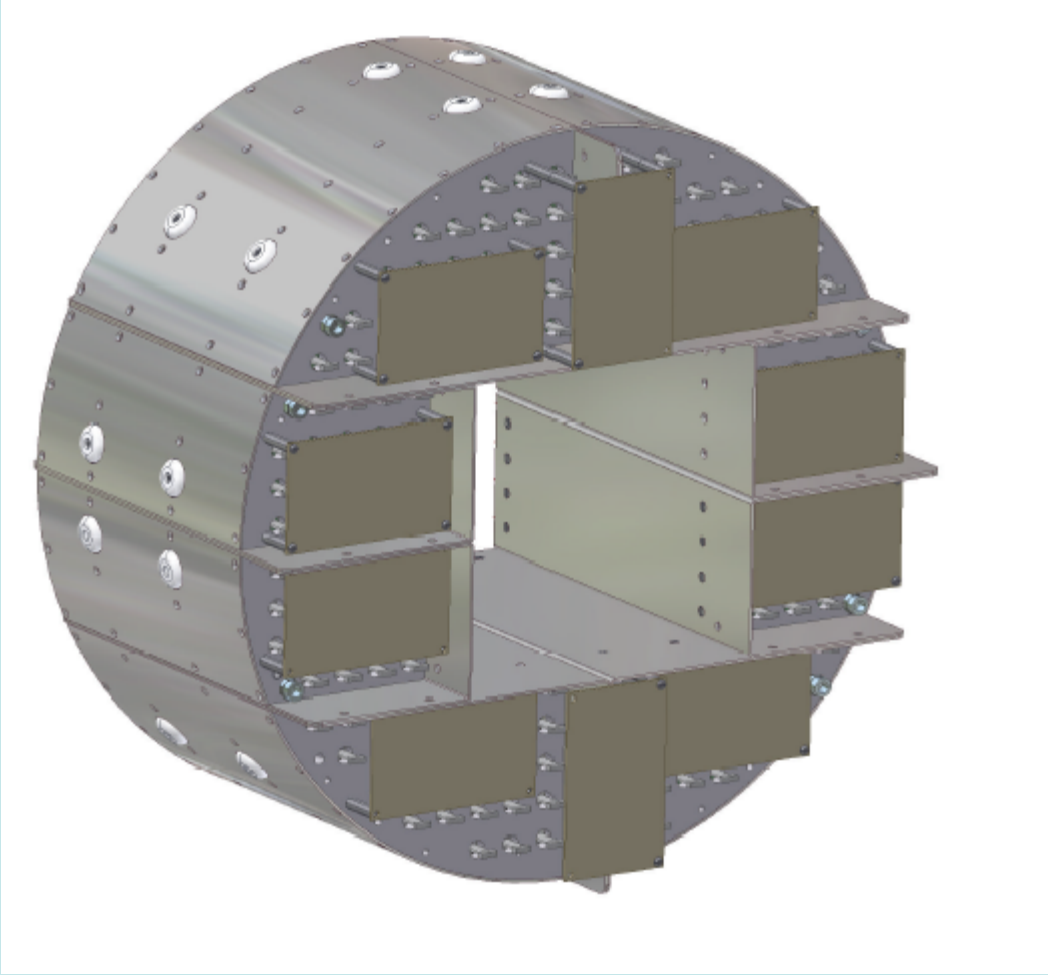
10. Rotate modules clockwise, to normal position. Insert upper-west wedge module

11. Connect cables and gas lines, push assembly to back wall of cavity align and lock in position

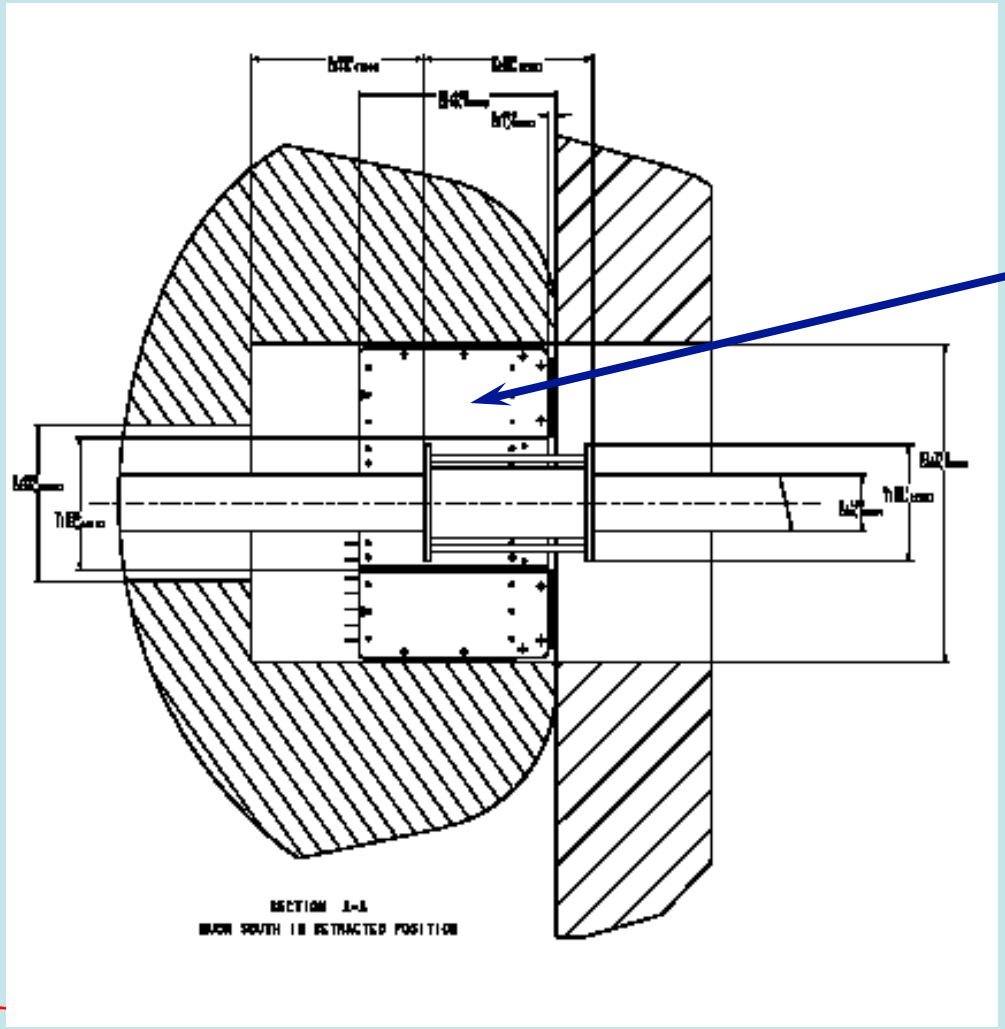
MPC South Design



MPC South Design

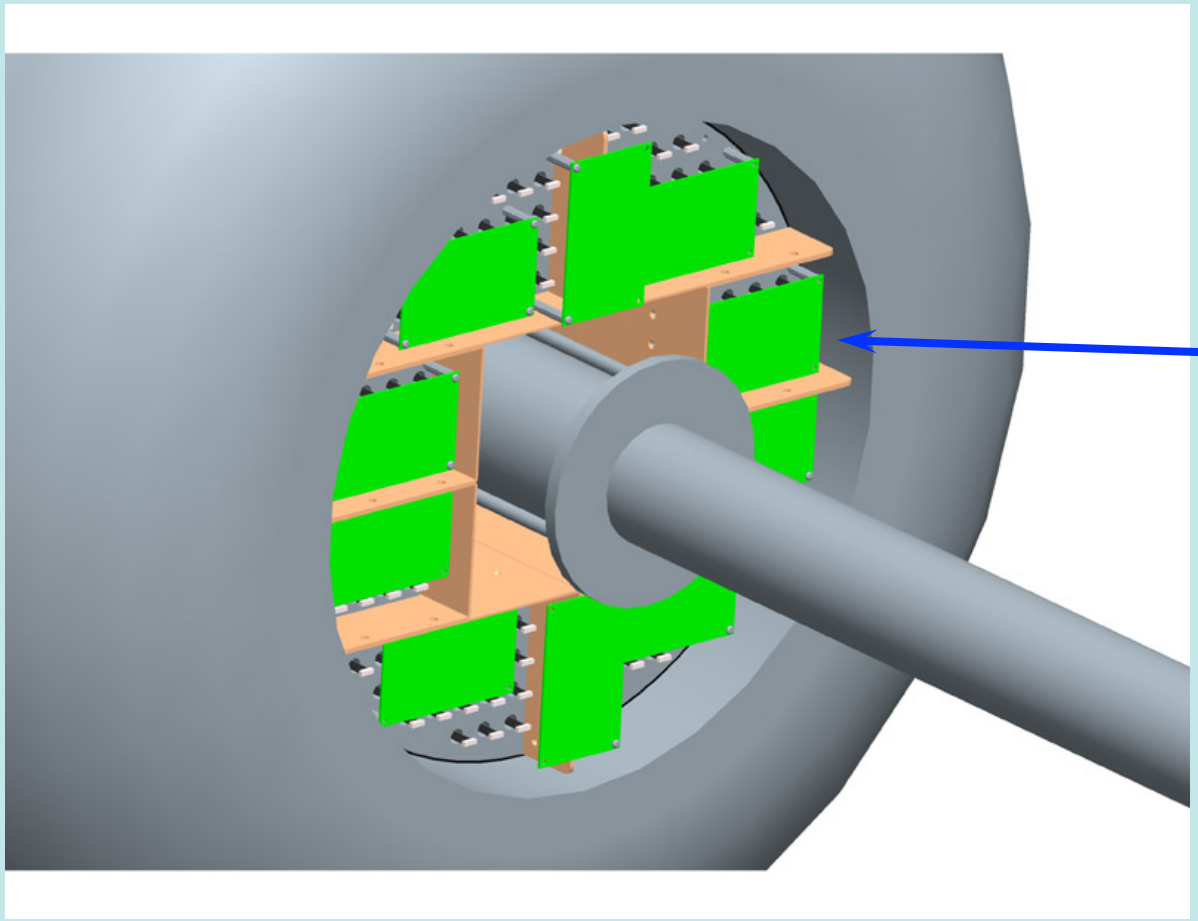


MPC South Design



MPC after all modules are installed, before moving back in cavity and before being cabled

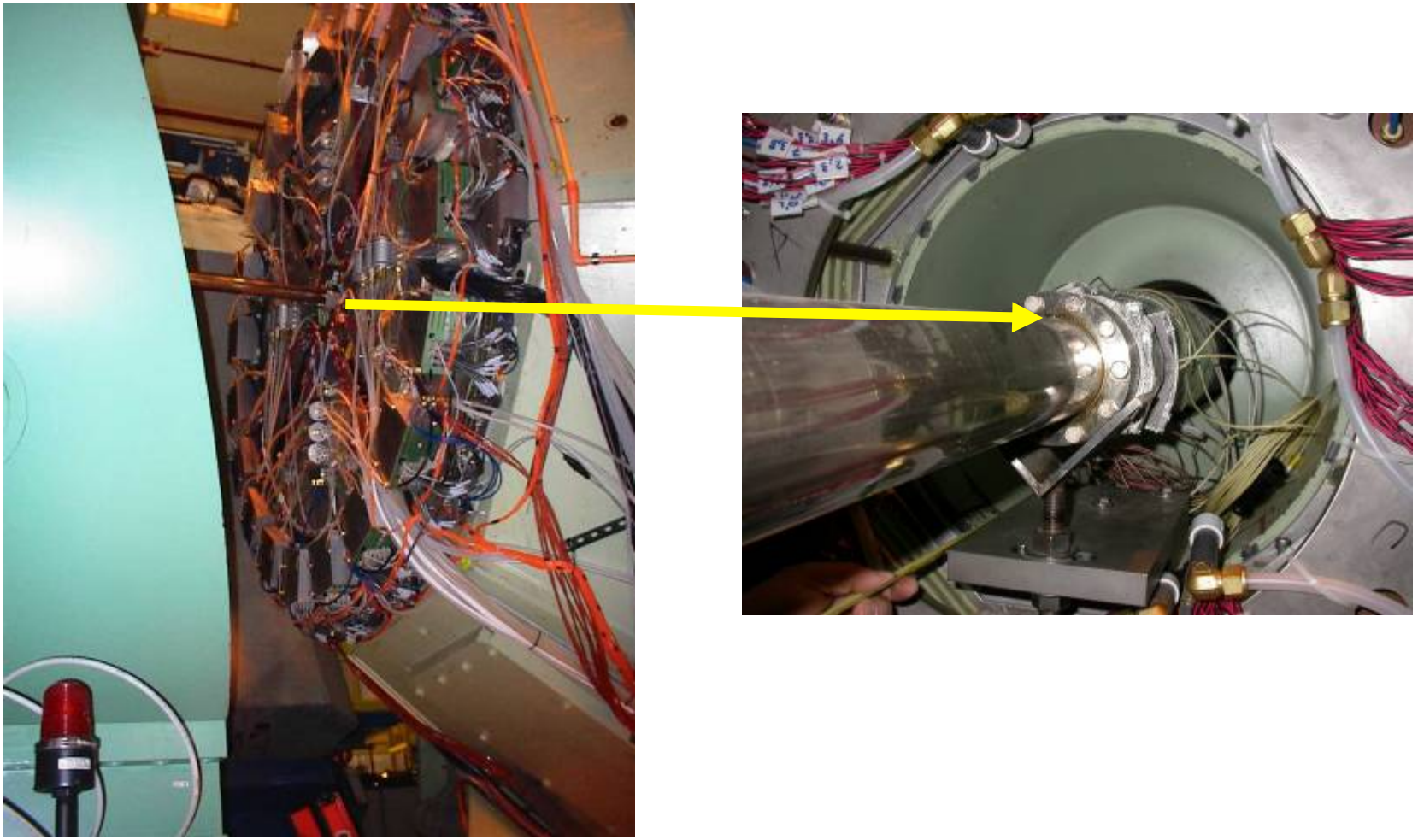
MPC South Design

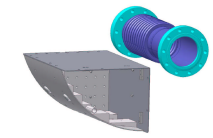


MPC after all modules are installed, before moving back in cavity and before being cabled

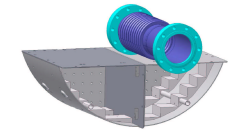
(MuTr Station 1 omitted for clarity)

MPC North is installed in the Muon Magnet North piston cavity





1



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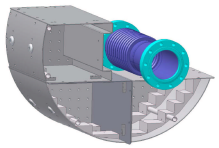

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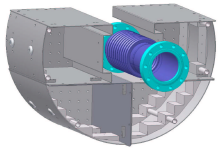

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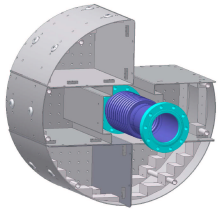

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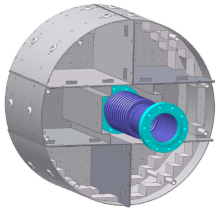


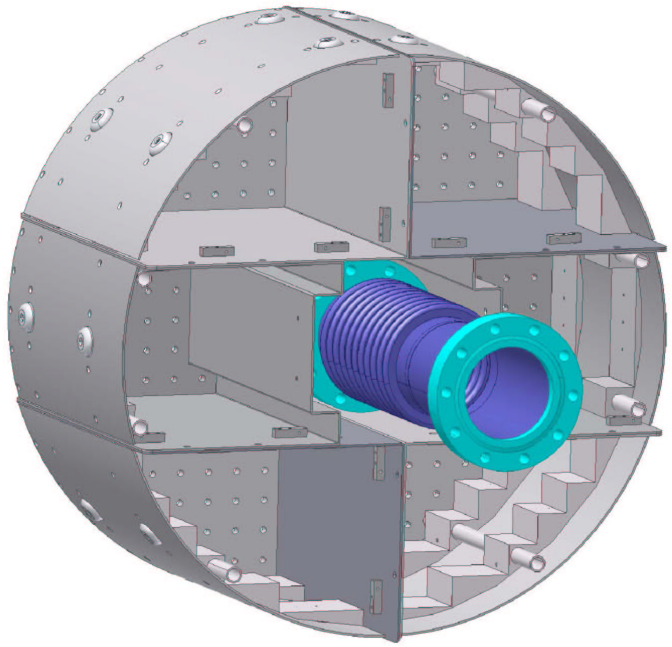
6

Empty sextants are removed first. LED's and LED board are upgraded tested and reinstalled.

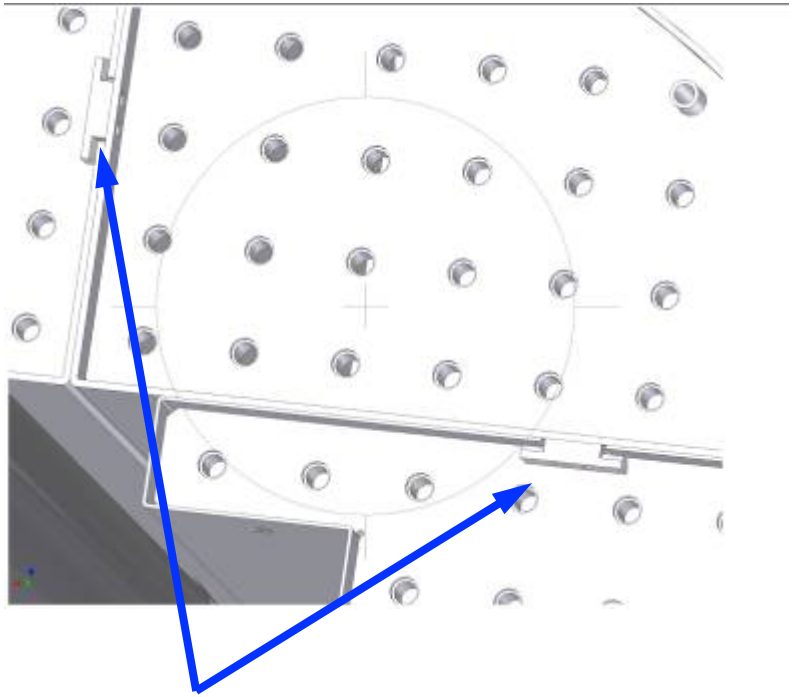
Then modules are individually inserted.

Next APD cable is attached then snaked through cover which is attached.

Finally, standoffs and signal pcbs are attached, wired and routed to MPC N rack.

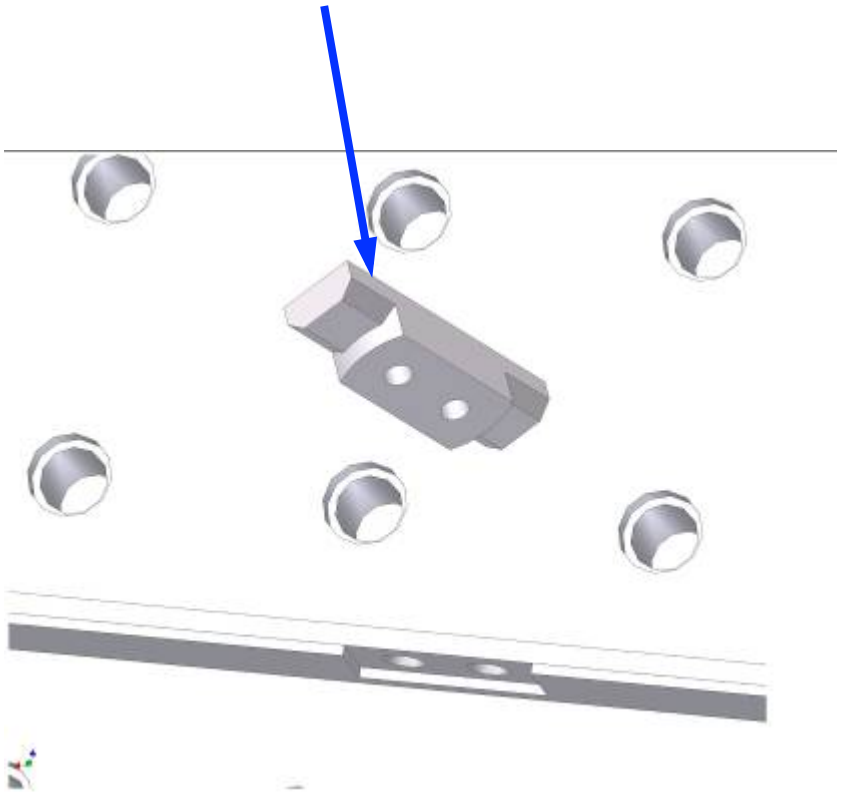


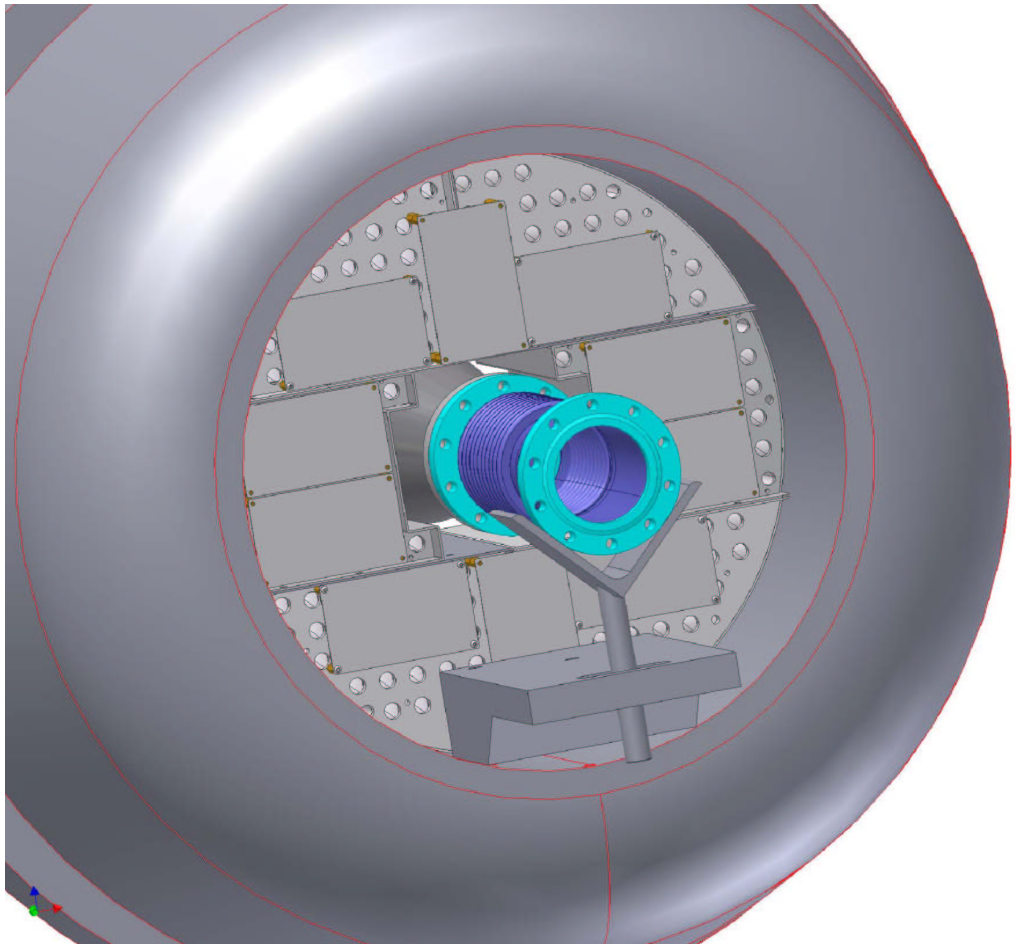
All of the empty sectors are installed before the crystals are inserted



Modules interconnect at rear using tabs as in MPC S

Tabs for MPC N modified for increase clearance and rounded for easy locating and self centering





MPC North mechanical assembly complete ready for cabling